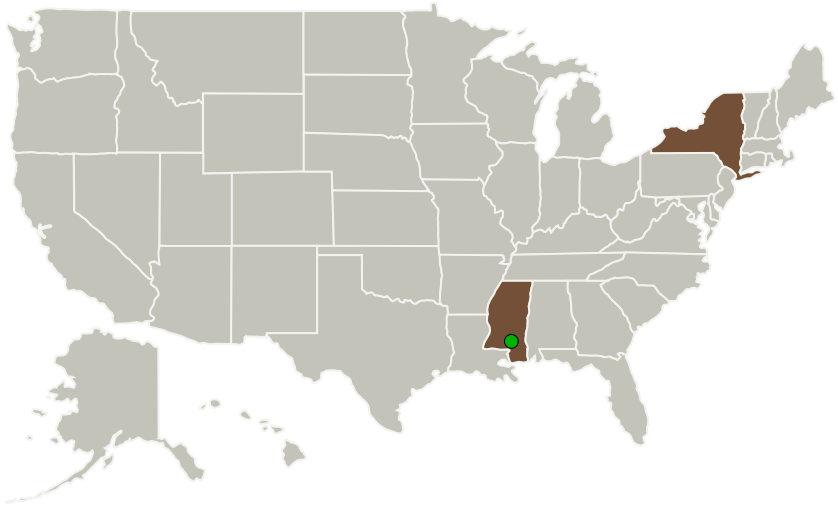
Hydrogen Wave Heater for Nuclear Thermal Propulsion Component Testing, Phase II

Completed Technology Project (2015 - 2018)

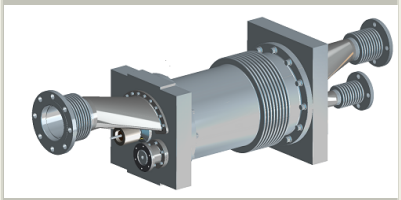
Project Introduction

NASA has identified Nuclear Thermal Propulsion (NTP) as an approach that can provide the fastest trip times to Mars and as the preferred concept for human space travel. In order to perform component testing in support of NTP engine development, an efficient means for delivering high-flowrate, high-temperature hydrogen is required. Non-nuclear generation of the desired hydrogen flowrates and temperatures for ground test of NTP components and subsystems is problematic. ACENT Laboratories is developing a Hydrogen Wave Heater (HWH) for this application. The HWH is an innovative embodiment of a wave rotor. Wave rotors can be used as a primary compressor/heater or as a topping compressor/heater to multiply the temperature and pressure of an existing compression or heating process. These highly-scalable continuous-flow devices are capable of flow rates in excess of 100 lb/s and temperatures over 5000 F.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
ACENT Laboratories LLC	Lead Organization	Industry	Manorville, New York
Stennis Space Center(SSC)	Supporting Organization	NASA Center	Stennis Space Center, Mississippi



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Primary U.S. Work Locations	
Mississippi	New York

Project Transitions

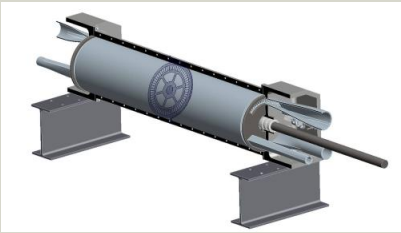
May 2015: Project Start

July 2018: Closed out

Closeout Documentation:

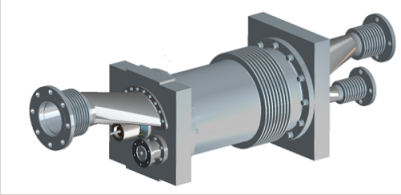
- Final Summary Chart*(https://techport.nasa.gov/file/137713)*

Images



Briefing Chart
Hydrogen Wave Heater for Nuclear Thermal Propulsion Component Testing Briefing Chart
(https://techport.nasa.gov/image/136865)

Final Summary Chart Image
Hydrogen Wave Heater for Nuclear Thermal Propulsion Component Testing, Phase II
(https://techport.nasa.gov/image/134742)



Final Summary Chart Image
Hydrogen Wave Heater for Nuclear Thermal Propulsion Component Testing, Phase II
(https://techport.nasa.gov/image/134889)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
ACENT Laboratories LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

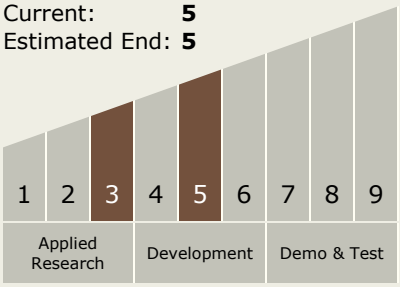
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Robert P Kielb

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Hydrogen Wave Heater for Nuclear Thermal Propulsion Component Testing, Phase II

Completed Technology Project (2015 - 2018)

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.4 Advanced Propulsion
    - TX01.4.3 Nuclear Thermal Propulsion

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System